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THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

PRELIMINARY ANNOUNCEMENT OF THE COLUMBUS, OHIO, MEETING

Edited by Dr. F. R. MOULTON

PERMANENT SECRETARY

FROM next December 27 to January 2 the association and about 30 of its affiliated and associated societies will meet in Columbus, Ohio. This will be the one hundred fifth meeting of the association.

Columbus, the capital of Ohio, is a city of approximately 500,000 inhabitants situated near the center of the state and the center of population of the country. It is the seat of the Ohio State University, which has more than 17,000 students. Although the university has a campus of nearly 400 acres, most of its fifty buildings are within three miles of the business and hotel district of the city. A number of other state institutions and the Ohio Wesleyan University, located at Delaware only twenty-three miles distant, add to the large scientific population of the region. Moreover, Ohio is noted for having perhaps more colleges than any other equal area in the world.

REGISTRATION

Registration will be in the Civic Auditorium, which is only a few blocks from the Deshler-Wallick Hotel, the headquarters of the meeting. The Annual Science Exhibition and social center of the meeting will also be in the same building.

Each person registering will receive a General Program of the meeting and a badge of admission to the address of the retiring president and to other general sessions. The General Program contains the programs of all sections and societies and their places and times of meeting, a schedule of all general sessions, a list of

all symposia, a catalogue of exhibits in the annual science exhibition, a schedule of all dinners, luncheons, social functions and excursions, and an alphabetical list of all persons who present addresses, papers or exhibitions during the meeting. Since about 200 scientific sessions will be held, before which at least 1,600 addresses and papers will be presented, a well-organized general program is necessary for a person to make best use of the precious hours he will be among his fellow scientists in Columbus.

Although the registration fee is only $1, there has been a tendency for the members of some affiliated societies to neglect to register at the meetings. With the growing complexity of science and the increasing importance of the inter-relations of science, scientists owe it to themselves, even from the most selfish point of view, to mingle widely with their fellow scientists. And quite apart from their own direct interests, they owe a heavier responsibility to our civilization than ever before. The British Association for the Advancement of Science requires a person to register before he may attend any sessions whatever of the meeting, and the registration fee is about $10!

Hotels and Headquarters

General Headquarters: Deshler-Wallick Hotel.

Headquarters of the sections of the association and of the affiliated and associated societies meeting with the association in Columbus are as follows:

Deshler-Wallick: All sections of the association except G and O, American Physical Society, American Association of Physics Teachers, Sigma Pi Sigma, American Society of Zoologists, American Association of Economic Entomologists, Entomological Society of America, American Society of Parasitologists, American Society of Naturalists, American Microscopical Society, Metric Association, American Science Teachers Association, Society of the Sigma Xi, United Chapters of Phi Beta Kappa, Honor Society of Phi Kappa Phi and Pi Gamma Mu. Rates: with bath—single, $3–$7; double, $5–$10.

Neil House: Section on Botanical Sciences (G), Botanical Society of America, American Phytopathological Society, American Society of Plant Physiologists, Mycological Society of America, Sullivant Moss Society, American Fern Society, Genetics Society of America, National Association of Biology Teachers. Rates: with bath—single, $3–$5; double, $4.50–$7.

Fort Hayes: Section on Agriculture (O), Ecological Society of America, Limnological Society of America, Phi Sigma Society, American Society of Agronomy, Potato Association of America, Gamma Alpha Graduate Scientific Fraternity. Rates: with bath—single, $2 and up; double, $3.50 and up.

Chittenden: American Meteorological Society, Society for Research on Meteorites, American Nature Study Society, History of Science Society, American Mathematical Society, Mathematical Association of America, National Council of Teachers of Mathematics. Rates: with bath—single, $2.50–$3; double, $3.50–$4.50; without bath—single, $1.50–$2.50; double, $2.50–$3.50.

Other Hotels in Columbus

Seneca: Rates: with bath—single, $2; double, $3.50–$6.

Southern: Rates: with bath—single, $2.50–$3; double, $3.50–$4.50; without bath—single, $1.50–$1.75; double, $2.50–$2.75.

Virginia: Rates: with bath—single, $2 and up; double, $3–$4; without bath—single, $1.50; double, $2.50.

Broad-Lincoln: Rates: with bath—single, $2 and up; double, $3–$4.50.

Note: The Deshler-Wallick Hotel has available large-capacity rooms with combination tub and shower and single beds; three persons in a room, $2.50 per person per day; for four persons in a room, $2 per person per day.

The mathematical societies, the American Society for Horticultural Science and Sigma Delta Epsilon Graduate Women's Scientific Fraternity have arranged for rooms in dormitory buildings on the campus of the Ohio State University. Information about these rooms will be contained in announcements from the societies named.

Transportation

Columbus is at the almost exact geographical center of Ohio, and it is about 200 miles east of the center of population of the United States. Columbus may be reached conveniently by railroad, by airplane or by bus. Forty highways pass through Columbus, 15 divisions of five trunk-line railways serve the city, and there is airplane service on two lines.

Railway fares have been substantially reduced this year, both for one-way tickets and for round-trip tickets. Special fares will be in effect during the period of the meeting, information respecting which and time schedules may be obtained from local agents of transportation companies. At the present fares, round-trip railroad tickets to Columbus, exclusive of Pullman fares, from representative cities are as follows: Baltimore, $28.25; Boston, $44.70; Chicago, $18.30; New York, $35.40; Philadelphia, $30.70; Washington, $28.25; Atlanta, $28.50; New Orleans, $44.80; San Francisco, $109.20.

Official Meetings

The Executive Committee of the association, to which matters for the council are first submitted, will meet at 10:00 A.M. on Wednesday, December 27, in the

permanent secretary's rooms in the Deshler-Wallick Hotel, and thereafter as may be arranged. The council of the association will meet at 2:00 P.M. on Wednesday, December 27, in the Wallick Suite of the Deshler-Wallick Hotel and thereafter as may be arranged. The council will elect a president and other officers of the association at a meeting that will be held in the Wallick Suite at 9:00 A.M. on Saturday, December 30.

The Academy Conference will be held at 3:00 P.M. on Wednesday in the Wallick Suite of the Deshler-Wallick Hotel. The conference will be followed by a complimentary dinner to one representative of each affiliated academy and to designated representatives of the association.

The Secretaries Conference will be held at 9:15 on Friday evening in the Wallick Suite of the Deshler-Wallick Hotel. The secretaries of the sections of the association and of all affiliated and associated societies are invited to attend.

Annual Science Exhibition

The annual science exhibition, which will be housed in the Civic Auditorium within five minutes' walk of the principal hotels, will include exhibits both of research laboratories and of manufacturers of scientific apparatus, equipment and supplies. In addition, the outstanding books on science published during 1939 will be on display and available for examination. Interesting and important scientific motion-picture films will be exhibited adjacent to the science exhibition.

Symposia and Joint Sessions

Recent meetings of the association have been distinguished by comprehensive symposia organized by the sections and cooperating societies. The Columbus meeting will maintain the high level of previous meetings. Among the symposia that promise to be of importance and wide interest are those on "Isotopes" and "Photosynthesis," organized by the Section on Chemistry; "Speciation," organized by the American Society of Zoologists, in cooperation with the Genetics Society of America; "The Relation of Ecology to Human Welfare," organized by the Ecological Society of America; "Defense Mechanisms in Plants and Animals," organized by the American Society of Naturalists; "The Internal Environment and Behavior," organized by the Section on Psychology; "Effects of Science upon Human Beings," organized by Alan Gregg for the Section on the Social and Economic Sciences; and "Blood, Heart and Circulation," organized by the Section on Medical Sciences. For a complete list of symposia and joint sessions consult the programs of the sections and societies which follow.

The association is publishing symposia that are "of such high order of scientific merit that it can not afford not to publish them." It has published several in the field of public health on such subjects as "The Cancer Problem," "Tuberculosis and Leprosy," "Syphilis" and "Mental Health," with "The Gonococcus and Gonococcal Infection" now in press. Each of these symposia has added to the value and prestige of the previous ones, and the officers of the association look with satisfaction on others to follow on such subjects as "Blood, Heart and Circulation" (the Columbus Meeting) and "Malaria" (the Philadelphia Meeting). It is desired that other sections and societies, especially those in the broad fields of biology, will even more vigorously than in the past formulate plans for series of symposia of the highest character in respect to organization, participants, character of contributed papers and comprehensiveness with the hope that they will be published by the association. The success of the symposium on "Problems of Lake Biology" (now in press), organized by the Limnological Society of America, is a promise of the welcome that they will receive. In organizing, presenting and publishing such symposia, the societies concerned and the association will fulfil their primary purposes.

General Sessions

All evening general sessions will be held at 8:15 in Memorial Hall, which has a seating capacity of 3,500 persons. The places at which other general sessions will be held are stated in connection with their announcement.

Wednesday evening, December 27. Dr. Wesley C. Mitchell, of Columbia University, will deliver an address as retiring president of the association on "The Public Relations of Science."

Thursday evening, December 28. The annual address under the joint sponsorship of the association and the Society of the Sigma Xi will be delivered by Dr. Kirtley F. Mather, of Harvard University, on "The Future of Man as an Inhabitant of the Earth."

Friday, December 29. At 4:30 P.M. Dr. Julian Huxley, of London, England, will deliver the first address in America under the arrangement with the British Association for the Advancement of Science for exchange lectures on alternate years. His address, on "Science, War and Reconstruction," will be delivered in the Chapel in University Hall.

Friday evening, December 29. The annual address under the auspices of the United Chapters of Phi Beta Kappa will be delivered by Dean Marjorie Nicolson, of Smith College, on "Science and Literature."

Breakfasts, Luncheons and Dinners

Wednesday, December 27

Luncheon: American Meteorological Society.

Dinners: Section on Chemistry. Ecological Society of America.

Thursday, December 28

Luncheons: Gamma Alpha. Sigma Delta Epsilon.

Dinners: American Mathematical Society and The Mathematical Association of America. Section on Chemistry. American Association of Economic Entomologists and The Entomological Society of America. The American Phytopathological Society. American Society of Plant Physiologists. Joint dinner by Section on Psychology and Section on Education. Biologists' Smoker.

Friday, December 29

Breakfasts: Phi Kappa Phi. Sigma Delta Epsilon.

Luncheons: American Astronomical Society. American Society of Parasitologists. Genetics Society of America. American Nature Study Society. Pi Gamma Mu. Sigma Pi Sigma.

Dinners: American Astronomical Society. American Society of Zoologists. Section on Teaching of American Association of Economic Entomologists. The Botanical Society of America and all botanists. National Association of Biology Teachers. American Society for Horticultural Science.

Saturday, December 30

Luncheon: Subsection on Dentistry.

Dinners: American Society of Naturalists. Phi Sigma Society.

SECTION AND SOCIETY PROGRAMS

Section on Mathematics and Affiliated Societies. On Thursday morning the section will hold a joint session with the American Mathematical Society, at which J. R. Kline, retiring chairman of the section and vice-president of the association, will deliver an address on "The Jordan Curve Theorem." On Thursday evening the Section on Mathematics, the American Mathematical Society and The Mathematical Association of America will hold a joint dinner. On Friday morning the Section on Mathematics, the Section on Geology and Geography and the American Mathematical Society will hold a joint session on "Applications of Mathematics to Geological and Geophysical Problems."

The American Mathematical Society will hold a session on Thursday afternoon, before which D. H. Lehmer will deliver an invited address on "The Applications of Bernoulli Polynomials to Some Problems in Diophantine Analysis."

On Wednesday afternoon at 4:30 the J. Willard Gibbs annual lecture will be delivered by Theodor von Kármán on "Grappling with Non-linear Problems."

The Mathematical Association of America will hold sessions on Friday afternoon and Saturday morning, with addresses by W. B. Carver and T. C. Frye on "The New Mathematical Reviews." Papers will also be presented by Henry Blumberg, Saunders MacLane, G. T. Whyburn and E. F. Beckenbach. On Friday afternoon the Mathematical Association of America and the National Council of Teachers of Mathematics will hold a joint session for discussing subjects of common interest.

Section on Physics and Affiliated Societies. On Friday afternoon the section will hold a joint session with the American Physical Society and the American Association of Physics Teachers at which Herbert E. Ives, retiring chairman of the association, and John T. Tate, president of the American Physical Society, will deliver addresses.

The American Physical Society will hold its forty-first annual meeting (its 232d regular meeting) from Thursday to Saturday, inclusive. The society and the American Association of Physics Teachers will hold a joint dinner on Friday evening.

The American Association of Physics Teachers will hold sessions from Wednesday to Friday, inclusive. The American Meteorological Society will hold sessions on Wednesday and Thursday, the principal feature of which will be a program on "Rainfall and Evaporation in Relation to Run-off and Floods." A luncheon of the society will be held on Wednesday. The honorary society in physics, Sigma Pi Sigma, will hold a luncheon on Friday.

The Section on Chemistry. The section will hold sessions all day Wednesday and Thursday and on Friday morning, and will have its annual dinner on Wednesday evening in honor of the retiring vice-president of the section, Harold C. Urey, to which all friends of Dr. Urey are invited. On Thursday evening there will be a dinner especially for those interested in the symposium on "Photosynthesis," following which there will be a round-table discussion of the papers presented at the symposium. It is requested that those planning to attend either or both of these dinners notify, previous to the meeting, Dr. A. B. Garrett, Ohio State University, Columbus. The program of the symposium on "Isotopes," which will be held on Wednesday, beginning at 9 A.M., is as follows:

ISOTOPES

1. The Dependence of Physical and Chemical Properties on Mass, and the Separation of Isotopes. H. C. UREY.
2. The Nitrogen and Carbon Heavy Isotopes in Kinetic Research. H. S. TAYLOR.
3. The Electrical Separation of Isotopes in Quantity. LLOYD P. SMITH.
4. Measurement of Isotopic Abundances in the Heavy Elements. A. J. DEMPSTER.
5. Methods of Increasing the Efficiency in Thermal Separation of Isotopes. A. KEITH BREWER.
6. Thermal Separation of Isotopes. W. W. WATSON.
7. The Atomic Masses of the Lighter Isotopes. K. T. BAINBRIDGE.
8. Accurate Determinations of the Relative Abundances of Isotopes. A. O. C. NIER.

The program of the symposium on "Photosynthesis," which will be held on Thursday at 9 A.M., is as follows:

PHOTOSYNTHESIS

1. Introductory remarks. CHARLES FRANKLIN KETTERING.
2. Induction and Related Phenomena. E. D. MCALISTER.
3. The Efficiency of Photosynthesis. FARRINGTON DANIELS.
4. The Absorption of Radiant Energy by Leaves. W. E. LOOMIS.
5. Relation of Photo-Oxidation to Solarization. J. E. MEYERS and G. O. BURR.
6. A brief review of Certain Investigations on Chlorophyll and Photosynthesis at the C. F. Kettering Laboratories. O. L. INMAN.
7. Factors Influencing the Apparent Efficiency of Photosynthesis. ROBERT EMERSON.
8. The Growth of Plants under Artificial Light. JOHN M. ARTHUR.
9. On the Purification of the Chlorophyll Components. F. P. ZSCHEILE.
10. Relative Amounts of Photosynthesis in the Yellow, Green, and Blue Mercury Lines. G. RICHARD BURNS.
11. Variations in the Daily Rate of Photosynthesis in Mature Apple Trees during Four Successive Seasons. A. J. HEINICKE.
12. A Contribution to the Theory of Photosynthesis. JAMES FRANCK.
13. Chlorophyll as the Prosthetic Group of a Protein in the Green Leaf. EMIL L. SMITH.
14. The Physico-Chemical Properties of Chlorophyll in their Relation to Photosynthesis. EUGEN RABINOWITCH.

On Friday at 9 A.M. a session will be held at which 12 papers on a variety of subjects will be presented.

Section on Astronomy and Affiliated Societies. The section and its affiliated societies will meet from Wednesday to Saturday, inclusive. The sessions on Wednesday will be held at the Ohio State University and those on Thursday and on Friday morning at the Ohio Wesleyan University, at Delaware. On Friday afternoon, at the Ohio State University, R. M. Stewart will deliver an address at a joint meeting of the section and the American Astronomical Society as retiring chairman of the section and vice-president of the association. On Saturday morning the section will hold a joint session with the Society for Research on Meteorites. On Saturday and Sunday the Observatory of the Ohio Wesleyan University will be host to members and guests of the A. A. A. S. irrespective of their section affiliations.

Section on Geology and Geography and Affiliated Societies. The section and the Geological Society of America, in collaboration with the Section on Geology of the Ohio Academy of Science, will hold eight sessions, before which approximately 50 papers will be presented, including two joint sessions, one with the Section on Mathematics and one with the Section on Astronomy and The Society for Research on Meteorites. The general topic of the papers which will be presented on Wednesday morning is "Geomorphic and Glacial Problems on the Appalachian West Slope." On Wednesday afternoon Walter H. Bucher will deliver his address as retiring chairman of the section and vice-president of the association on "Problems of the North Atlantic Ocean." Dr. Bucher's address will be followed by a session for the presentation of papers on "The Non-Metallic Mineral Industry." The topic which will be discussed on Thursday morning is "Methods and Problems in the Teaching of Elementary Geology." On Thursday afternoon the subject for discussion is "Current Research in the Paleozoic Stratigraphy of the Ohio Basin." On Friday morning the section will hold a joint session with the Section on Mathematics and The Mathematical Society of America on "Applications of Mathematics in the Earth's Sciences." At the same time a joint session will be held with the Society for Research on Meteorites on "Meteorite Falls and the Rate of Accretion." The subject for discussion on Friday afternoon is "Hydrologic Problems in the Ohio and Michigan Basins." Among the speakers representing the section in the joint sessions are Walter D. Lambert, Lachlan Gilchrist, M. M. Slotnick, Archie Blake and Fletcher Watson.

Section on Zoological Sciences and Affiliated Societies. No section has stronger or more active affiliated societies than has Section F. Consequently, in order to serve most effectively the interests of zoology, the section gives way to the American Society of Zoologists, the Entomological Society of America, the American Association of Economic Entomologists and the American Society of Parasitologists in organizing programs in the field of the zoological sciences.

The American Society of Zoologists will hold sessions on Thursday, Friday and Saturday, at which approximately 300 papers will be presented. On Thursday afternoon the society will join with the Genetics Society of America in the presentation of a symposium on "Speciation," organized by Th. Dobzhansky, at which papers will be presented by Sewall Wright, E. M. Mayr, L. R. Dice, Warren P. Spencer and Th. Dobzhansky. On Friday morning the society will present a symposium on "Experimental Study of Cellular Organization," at which Robert Chambers, L. V. Heilbrunn, Daniel Mazia, M. H. Jacobs and Francis O. Schmitt will present papers. On Saturday afternoon the society will join with the American Society of Naturalists in sponsoring a symposium, organized by W. H. Taliaferro, on "Defense Mechanisms in Plants and Animals," at which papers will be presented by F. W. Went, W. C. Price and William Bloom. On Thursday evening, at 9 o'clock, the society will join with the American Society of

Naturalists and the members of other biological societies in the Biologists' Smoker. The annual dinner of the society, to which all zoologists and friends are invited, will be held on Friday evening, at which Wesley R. Coe, retiring chairman of the section and vice-president of the association, will deliver an address on "Divergent Pathways in Functional Development."

The Entomological Society of America will hold its thirty-fourth annual meeting on Wednesday, Thursday and Friday. On Wednesday afternoon the society will join with the American Association of Economic Entomologists in a symposium on "Fifty Years of Entomological Progress." On Thursday morning the society will hold a joint session with the Ecological Society of America, at which the papers will be devoted to insect ecology. The annual public address of the society will be delivered by A. Avinoff on "Adventures of a Lepidopterist in Jamaica," which will be illustrated by colored motion pictures and Kodachrome slides. On Thursday evening the society will join with the American Association of Economic Entomologists in the Entomologists' dinner. The other sessions of the society on Wednesday morning, Thursday afternoon and Friday will be devoted to papers by members of the society in the general field of entomology.

The American Association of Economic Entomologists will hold sessions from Wednesday to Saturday, inclusive, at which a total of 112 papers will be presented. In celebration of the fiftieth anniversary of the founding of the society, a symposium will be held jointly with the Entomological Society of America on "Fifty Years of Entomological Progress," with Herbert Osborn presiding. Papers will be presented on this program, each devoted to a period of ten years, by C. L. Marlatt, Lawson Caesar, C. L. Metcalf, E. O. Essig and S. A. Rohwer. The presidential address of the society will be delivered by E. R. Sasscer on "Undesirable Insect Aliens." The banquet of the society will be held on Thursday evening. On Friday morning the society will hold a joint symposium with the Section on Plant Quarantine and Inspection of the American Association of Economic Entomologists and the American Phytopathological Society on "Viruses and Plant Quarantine." On Friday evening the society's Section on Teaching will hold a dinner at the Southern Hotel, followed by a session at the Deshler-Wallick Hotel.

The American Society of Parasitologists will hold sessions on Thursday, Friday and Saturday, at which 77 papers and demonstrations will be presented, this being the largest program in the history of the society. At the sessions on Friday afternoon 33 papers will be presented on a demonstration program representing all fields of parasitology. On Thursday afternoon Cornelius B. Philip, United States Public Health Service, will show a thirty-minute colored motion-picture film on "How Rocky Mountain Spotted Fever Vaccine Is Prepared and Used." On Friday morning Horace W. Stunkard, president of the society, will deliver an address on "Life History Studies and the Development of Parasitology." On Friday at 12 o'clock a parasitologist luncheon will be held in Pomerene Hall of the Ohio State University, following which the society will hold its annual business meeting.

Section on Botanical Sciences and its Affiliated Societies. The section and its affiliated societies will meet from Thursday to Saturday, inclusive. On Thursday at 2 P.M. Raymond J. Pool, retiring chairman of the section and vice-president of the association, will deliver an address on "White Man versus the Prairie." This address will be followed by a paper on "Problems in Breeding for Disease Resistance," by Donald Reddick, another on "Recent Investigations in the Cytogenetics of Maize," by Barbara McClintock, and one on "The Communal Nature of the Fruiting Process in the Acrasieae," by Kenneth B. Raper.

The Botanical Society of America will hold meetings of its General, Paleobotanical, Systematic and Physiological sections on Thursday, Friday and Saturday mornings. On Thursday afternoon the society will hold a joint session with the other botanical societies. On Friday afternoon the Physiological Section of the society will hold a joint session with the American Society for Horticultural Science and the American Society of Plant Physiologists. Also on Friday afternoon, the General Section of the society will hold a joint session with the Ecological Society of America. On Friday evening the society will join in its annual dinner for all botanists, at which Arthur J. Eames, retiring president of the society, will deliver an address. On Saturday afternoon the society will join in the symposium on "Defense Mechanisms in Plants and Animals" organized by the American Society of Naturalists.

The American Phytopathological Society will hold its thirty-first annual meeting from Wednesday to Saturday, inclusive, at which approximately 120 papers will be presented. The first session of the society will be held on Wednesday afternoon. Among the papers presented at this session will be one on "The Influence of Ultraviolet Irradiation on the Pathogenicity of *Phytomonas tumefaciens*" by B. M. Duggar and A. J. Riker. On Wednesday evening at 7:15 the society will hold a "Plant Disease Survey," and at 8:15 P.M. a second conference on "The Resistance of Plants to Diseases," the latter under the chairmanship of E. C. Stakman. On Thursday morning three sectional meetings of the society will be held, one on "Diseases of Fruits," another on "Diseases of Small Grain Crops," and the third on "Diseases of Southern and Miscellaneous Crops." On Thursday afternoon the society will hold a joint session with the

ection on Botanical Sciences and its other affiliated ocieties. Also on Thursday afternoon the Extension lant Pathologists will hold a conference on "Fire light of Apple and Pear." On Thursday evening e society will hold its annual dinner at 6:30 o'clock the Neil House. On Friday morning the society ill hold a joint session with the American Association Economic Entomologists. Also on Friday morning e society will hold three sectional meetings, one on Virus and Tobacco Diseases," the second on "Diseases Vegetables," and the third on "Fungicides and Dis-ases of Cherries." On Friday afternoon the society ill hold a round-table conference on "Laboratory esting of Fungicides," during which such subjects standardization of the fungus and factors involved deposition of sprays will be considered. On Friday vening a conference will be held on "Eradicant Fun-icides," with reports on old and new eradicant fungi-ides by G. W. Keitt, H. W. Anderson, R. C. Baines nd E. E. Wilson. On Saturday morning the society ill hold a joint session with the Potato Association f America. Also on Saturday morning the society ill hold a joint session with the Floriculture Section of the American Society for Horticultural Science on The Diseases of Ornamental Plants." A third joint session will be held on Saturday morning with the Mycological Society of America. A fourth joint ses-ion will be held on Saturday morning with the Society of American Foresters on "The Diseases of Trees." On Saturday afternoon the society will hold a joint session with the Physiological Section of the Botanical Society of America and the American Society of Plant Physiologists on "Cotton Diseases and the Relation of Physiology to Disease." Two distinguished foreign scientists will appear on the program of the society, Dr. Jean Dufrenoy, of Corrèze, France, and Dr. A. A. Bitancourt, of São Paulo, Brazil. Special attention is called to the fact that the society has made arrange-ments for a display of phytopathological exhibit mate-rial during the meetings. Pathologists who desire to exhibit material are requested to communicate with Dr. A. L. Pierstorff, Ohio State University.

The American Society of Plant Physiologists will hold sessions from Thursday to Saturday, inclusive. On Thursday afternoon the society will hold a joint session with the Section on Botanical Sciences, the Botanical Society of America and the American Phyto-pathological Society. On Thursday evening the society will hold its annual dinner at which the presidential address will be delivered by W. F. Loehwing and the Charles Reid Barnes life membership award will be announced. On Friday morning the society will hold a session for the presentation of papers and on Friday afternoon a joint symposium with the American So-ciety for Horticultural Science on "Physiological Processes of Plants in Relation to Temperature." On Friday evening the society will join in the dinner for all botanists. Following the dinner a symposium will be held under the chairmanship of O. F. Curtis on "The Teaching of Plant Physiology." On Saturday morning a session will be held for the presentation of general papers. On Saturday afternoon the session will be held in two sections, the second of which will be a joint symposium with the American Phytopatho-logical Society and the Physiological Section of the Botanical Society of America on "Cotton."

The Mycological Society of America will meet from Thursday to Saturday, inclusive. On Thursday morn-ing the address of the retiring president of the society will be delivered, following which will be a regular program, including papers on new fungi from the northwest and Bermuda, fungi parasitic on man, fungi parasitic on plants, and several papers on morphology, physiology and genetics of fungi. On Thursday after-noon the society will hold a joint meeting with the Section on Botanical Sciences, and on Saturday morn-ing it will present a joint program with the American Phytopathological Society.

The American Fern Society will hold its annual meeting on Saturday morning, at which Robert T. Clausen, president of the society, will deliver an address.

Societies Affiliated with the Sections on Zoological Sciences and Botanical Sciences. The American So-ciety of Naturalists will hold its fifty-seventh annual meeting on Thursday afternoon, at which, in coopera-tion with the American Society of Zoologists, the Botanical Society of America and the Genetics Society of America, it will present a symposium on "Defense Mechanisms in Plants and Animals." The program consists of three formal papers; "Local Reactions in Plants," by F. W. Went; "Generalized Reactions in Plants," by W. C. Price; and "Local and Generalized Reactions in Animals," by William Bloom. The an-nual business meeting will follow the symposium, and the Naturalists' Dinner will be held at 6:30 in the evening, at which the presidential address will be delivered by Ivey F. Lewis on "Cell Reactions."

The Ecological Society of America will meet from Wednesday to Saturday, inclusive. The program for Wednesday morning consists of a business meeting and a general session for animal ecologists. On Wed-nesday afternoon the society will present a symposium on "The Relation of Ecology to Human Welfare," Charles C. Adams presiding. The participants in the symposium are Homer L. Shantz, C. W. Thornthwaite, Benton MacKaye, Robert E. Park, A. B. Hollingshead and E. C. Lindeman. The society will hold a banquet on Wednesday evening, at which the retiring president, Charles T. Vorhies, and A. H. Wright will speak. On Thursday morning the society will hold a joint session with the Entomological Society of America and also a

general session for animal ecologists. On Thursday afternoon, in addition to a session on animal ecology, there will be a meeting, at 4 o'clock, of the Committee on the Preservation of Natural Conditions. On Friday morning the society will hold a general session, a joint session with the Botanical Society of America and a joint session with the Limnological Society of America.

The American Microscopical Society will hold its fifty-eighth annual meeting on Thursday afternoon. The formal session will consist of a meeting of the executive committee, followed by the annual meeting of the society.

The Genetics Society of America will meet from Thursday to Saturday, inclusive. On Thursday it will join the American Society of Zoologists in a symposium on "Speciation," and on Saturday it will join the American Society of Naturalists and other societies in a symposium on "Defense Mechanisms in Plants and Animals." On Friday the society will present an invitation program at which the speakers will be Karl Sax, L. C. Dunn, M. R. Irwin, M. Gordon and B. P. Kaufman.

The Limnological Society of America will hold its fifth annual meeting on Thursday to Saturday, inclusive. It is planned to have at least three half-day sessions for the presentation of papers. On Friday forenoon the society will hold a joint meeting with the Ecological Society of America and will provide about one half the program.

Phi Sigma Society will hold sessions on Friday and Saturday. The speakers on the scientific programs will be student members of the society. A banquet will be held on Saturday evening, at which Paul B. Sears will deliver an address on "The Scientist as a Citizen."

The National Association of Biology Teachers will meet on Friday, both morning and afternoon, and will hold a dinner in the evening.

The Section on Anthropology will hold a one-day session on Wednesday at the Museum of the Ohio State Archaeological and Historical Society. Papers will center on the theme of the North American Indians and their archeological cultures. The address of the retiring chairman of the section, Diamond Jenness, will be on "Canada's Indian Problems." Section members will be shown the Museum by Director H. C. Shetrone and will inspect the recently established Lithic Laboratory. At the conclusion of the sessions adjournment will be to the Chicago meeting of the American Anthropological Association.

The Section on Psychology will hold sessions from Wednesday to Friday, inclusive. Besides several sessions for the presentation of general papers, there will be a symposium on Thursday morning on "The Internal Environment and Behavior," under the chairmanship of Ross A. McFarland. In this symposium, the effect of changes in the blood stream on the brain and consequent alterations in behavior will be discussed. Special emphasis will be given to the effects of alterations in temperature, oxygen, blood sugar and the endocrines. Also on Thursday, there will be a joint session with the Section on Education and a joint dinner with the same section, at which J. F. Dashiell will speak on "A Neglected Fourth Dimension to Psychological Research."

The Program of the Section on the Social and Economic Sciences will consist of three parts, a session on Friday under the chairmanship of Alan Gregg, a conference under the sponsorship of the American Association of Scientific Workers on "Science and the Public," and a luncheon by Pi Gamma Mu on Wednesday, at which officers of the association will speak.

The Program of the Section on Engineering will consist in part of a session by the Institute of Radio Engineers.

The Section on Medical Sciences will present a program, consisting of six sessions for the presentation of a symposium, on "Blood, Heart and Circulation," and a joint session with the biological societies sponsoring the symposium on "Defense Mechanisms in Plants and Animals." The subjects of the six divisions of the symposium on "Blood, Heart and Circulation" are: "Blood"; "The Physiology of Coronary Blood Flow"; "Pathology of the Coronary Circulation"; "Cardiac Failure"; "Hypertension," and "Heart and Circulation in Special Territories." On Thursday morning the address of Carl J. Wiggers, retiring chairman of the section and vice-president of the association, will be delivered on "Pathways of Natural Progress." On Thursday afternoon the Theobald Smith Award in Medicine will be presented to Albert B. Sabin by Walter B. Cannon, president of the association, following which Dr. Sabin will deliver an address entitled "Constitutional Barriers to Involvement of the Nervous System by Certain Viruses."

The Subsection on Pharmacy of the Section on Medical Sciences will hold a session on Wednesday morning at which five papers will be presented, and another on Wednesday afternoon at which four papers will be presented. The papers for the morning program are: "The Chemistry of the Viburnums," by Justin L. Powers; "Methenamine Mandelate: Preparation, Toxicity, and Antiseptic Value," by Glenn L. Jenkins; "The Bioassay of Aconite," by B. V. Christensen and J. W. Nelson; "The Use of Oral Vaccine in the Prophylaxis of the Common Cold," by Leonard J. Piccoli; and "Solanum Carolinense," by R. L. Murray. The papers for the afternoon session are: "A Method for the Determination of Peptic Activity," by Carl J. Klemme and Lee F. Worrell; "Employee Predictive Tests," by C. M. Brown; "The Pharmacology of Soaps," by Leroy D. Edwards; and "A Criterion for Distinguishing be-

tween Virgin and Parous Animals," by Richard A. Deno.

The Subsection on Dentistry of the Section on Medical Sciences will hold a session on Thursday, at which papers will be presented on "Definite Oral Manifestations in Systemic Disease," by Lester Cahn, T. J. Cook, T. R. Blayney, Norman Topping, George Stein, W. N. Taylor and Bruce Wiseman.

The American Society for Horticultural Science will hold its meetings from Thursday to Saturday, inclusive. On Thursday afternoon the Vegetable Crop Section of the society will hold a joint session with the Potato Association of America. On Friday afternoon the society will hold a joint session with the American Society of Plant Physiologists, the Physiology Section of the Botanical Society of America, and the American Society for Horticultural Science on "Effects of Temperature on Absorption, Growth and Reproduction in Plants." On Saturday morning the Floriculture and Ornamental Horticulture Section of the society will hold a joint session with the American Phytopathological Society. On Saturday afternoon the society will hold a joint session with the Section on Agriculture and the Society of American Foresters, at which R. M. Salter, retiring chairman of the Section on Agriculture and vice-president of the association, will deliver an address on "Some Soil Factors Affecting Free Growth," following which there will be a symposium on "Problems of Fruit, Shade and Forest Trees." In addition to the program of 294 papers, the largest number in the history of the society, there will be four round-table discussions on Thursday evening on the following subjects: "Fruit Varieties and Nomenclature," "Extension Work," "Educational Methods" and "Vegetable Variety Types." At the banquet and social evening on Friday the retiring president, V. R. Boswell, will deliver an address on "Performance and Attitude of the Individual in Relation to Research Accomplishment."

The Potato Association of America will hold sessions on Thursday, Friday and Saturday. On Thursday afternoon the program will consist of a joint discussion with the American Society for Horticultural Science. On Saturday morning a joint session with the American Phytopathological Society will consider such topics as irrigation, grading and packaging, internal quality, crop reporting, bacterial ring rot and breeding for disease resistance.

Other Programs

The Society of the Sigma Xi will hold its fortieth annual convention at 4 P.M. on Thursday afternoon. The eighteenth annual lecture, given under the joint auspices of the association and the society, will be delivered by Kirtley F. Mather, of Harvard University, on "The Future of Man as an Inhabitant of the Earth."

The United Chapters of Phi Beta Kappa on Friday evening will present the fifth of its series of lectures at annual meetings of the association. Dean Marjorie Nicolson, of Smith College, will deliver an address on "Science and Literature."

The Graduate Scientific Fraternity, Gamma Alpha, will hold its annual meeting on Thursday, including a luncheon at the Hotel Fort Hayes.

The Honor Society of Phi Kappa Phi will hold business meetings on Thursday and Friday mornings, present a lecture open to the public on Thursday afternoon, and unite at a breakfast on Friday morning.

The Graduate Women's Scientific Fraternity, Sigma Delta Epsilon, will meet on Wednesday, Thursday and and Friday. On Wednesday afternoon the society will hold a business meeting. On Thursday a luncheon will be held for all women in science, at which Dr. Marie J. Weiss will deliver an address on "Genius and Youth in Mathematics." The annual breakfast of the society will be held on Friday morning, following which the annual convention of the society will be held.

The American Nature Study Society will hold meetings on Thursday, Friday and Saturday. On Thursday the society will meet jointly with the American Science Teachers Association; on Friday it will be host to the American Science Teachers Association in a program which will emphasize the place of nature study in the community, children's museums, teacher's colleges, the public press, conservation and the wildlife program. A broadcast will be demonstrated. The society will hold a luncheon on Friday noon. The Saturday program will be devoted to specific school problems, nature study work in state parks and a discussion of the contributions of affiliated chapters.

The American Science Teachers Association will meet on Thursday and jointly with the American Nature Study Society on Friday.

SCIENTIFIC EVENTS

THE PLATFORM OF THE AMERICAN MEDICAL ASSOCIATION

In the various actions of the House of Delegates during the special session held in Chicago in September last year, and again at the meeting in St. Louis, according to the *Journal* of the association, certain constructive proposals were made which had the full approval of the House of Delegates. Now the Board of Trustees has formulated these concepts into a constructive platform. This platform is set up as a guide to indicate the trend which the American Medical Association believes should be followed in the develop-

ment of health activities and medical care for the people of the United States. It is as follows:

1. The establishment of an agency of the federal government under which shall be coordinated and administered all medical and health functions of the federal government exclusive of those of the Army and Navy.

2. The allotment of such funds as the Congress may make available to any state in actual need, for the prevention of disease, the promotion of health and the care of the sick on proof of such need.

3. The principle that the care of the public health and the provision of medical service to the sick is primarily a local responsibility.

4. The development of a mechanism for meeting the needs of expansion of preventive medical services with local determination of needs and local control of administration.

5. The extension of medical care for the indigent and the medically indigent with local determination of needs and local control of administration.

6. In the extension of medical services to all the people, the utmost utilization of qualified medical and hospital facilities already established.

7. The continued development of the private practice of medicine, subject to such changes as may be necessary to maintain the quality of medical services and to increase their availability.

8. Expansion of public health and medical services consistent with the American system of democracy.

INTER-AMERICAN SOCIETY OF MICROBIOLOGY

AT the close of the third International Congress of Microbiology held in New York on September 9 and 10, steps were taken toward the establishment of an Inter-American Society of Microbiology.

The preliminary discussion clearly showed that inter-American cooperation in the field of microbiology presents opportunity for the solution of two major problems, both concerned with the advancement of the science of microbiology and making such accumulating knowledge more readily available to all scientific men in the Western Hemisphere.

The first of these problems consists in devising means for effecting a better exchange of the results of important studies in microbiology now being carried out in Latin America and in North America to the mutual advantage of all.

The second problem, directed toward essentially the same end, and of equal if not greater importance, comprehends the use of all present resources and the establishment of new ones to effect a more intimate affiliation between the workers of all countries in the study of those diseases which are common to all. This contemplates not only an exchange of the results of work done, but of workers as well, thus fostering through intimate association a better understanding of microbiological questions in the broader sense supplemented by a knowledge of the peculiar conditions which different geographic areas may bring to bear on such questions.

The basis for the first of these problems is the unfortunate fact that investigators in Canada and in the United States gain but fragmentary knowledge of the increasingly numerous important original contributions emanating from Latin America. This is due largely to the fact that comparatively few scientific men in North America are familiar with the Spanish and Portuguese languages.

It is the purpose of the Inter-American Society to approach a solution of this problem; first, through assuming editorial responsibility for one or more journals devoted to microbiology and allied subjects, and second, through organizing periodic inter-American congresses of microbiology.

The initial step in the problem involves the establishment of an *Inter-American Journal of Microbiology*, this to serve as the official organ of the society. It is proposed to make its pages available to contributors from both Latin America and North America, the necessary editorial work, including translations into English of the Spanish and Portuguese papers being done in the United States.

The Inter-American Society proposes to hold, within the next three years, the first Inter-American Congress on Microbiology at Rio de Janeiro in order to carry out that part of its program which can not be undertaken immediately. Dr. J. C. N. Penido, of Rio de Janeiro, was chosen to organize a committee to prepare for the congress. The presiding officer at this congress will be Dr. A. Fontes.

Dr. A. Sordelli, director of the Bacteriological Institute for the Department of Hygiene of Buenos Aires, was elected first president of the society. Dr. F. Duran-Reynals, of Yale University, was chosen executive secretary, charged with the duty of organizing within each of the American Republics a local committee to foster the interests of the society.

ACTIVITIES OF THE U. S. GEOLOGICAL SURVEY

DR. W. C. MENDENHALL, director of the U. S. Geological Survey, has sent to SCIENCE the following particulars in regard to the work of the survey.

The following members of the Geologic Branch have recently returned to Washington after completing their season's field work on the projects indicated: G. F. Loughlin, chief geologist, made an inspection trip of geologic field parties in the West. He spent two weeks examining the underground workings of gold mines in the Little Rocky Mountains, Montana, and conferred with field parties in the San Juan and Cripple Creek districts, Colorado, and in Death Valley, and also with officials in Denver and Salt Lake City; G. R. Mansfield attended the meetings of the Industrial Minerals Division of the American In-

titute of Mining and Metallurgical Engineers in Tuscaloosa, Ala., conferred with W. H. Monroe, of the Geological Survey, regarding investigations of the geology around Livingston, Ala., and Jackson, Miss., and inspected bentonite deposits in Monroe County, Miss.

For the fifteenth consecutive field season, geologic work was conducted by the Federal Survey in Colorado in cooperation with the Colorado Geological Survey and the Colorado Metal Mining Fund. The following projects were in progress this season: Geologic mapping, commenced in 1938 in the Alta and Palmyra Basins, was continued by John S. Vhay; field work on the geology and ore deposits of the Red Mountain area, Colo., has been concluded by W. S. Burbank; A. H. Koschmann continued his study of structure and ore deposits in the Cripple Creek mining district, and E. N. Goddard completed a study of gold deposits at Gold Hill.

Field work connected with the remapping of the Eureka mining district, central Nevada, has been terminated for this season by T. B. Nolan. During the summer, Mr. Nolan devoted approximately a month to study of tungsten districts in Nevada, California and Arizona; E. N. Goddard completed field work on the manganese deposits of the Philipsburg district, Montana; Charles F. Park continued field work on manganese deposits of the Olympic Peninsula, Washington. Mr. Park, assisted by Russell G. Wayland, also examined manganese deposits in the Butte district, Montana; F. G. Wells mapped chromium deposits in the Grants Pass and Kerby quadrangles, Oregon. He also studied the Pilliken chromium mine, in Eldorado County, Calif.; field work on the geology and mineral deposits of the Seven Devils mining district, western Idaho, conducted in cooperation with the Idaho Bureau of Mines and Geology, has been concluded by R. S. Cannon.

On the evening of November 6, Dr. J. B. Mertie, Jr., of the Alaskan Branch of the Geological Survey, delivered a lecture before the New York Academy of Sciences in the American Museum in New York City. Dr. Mertie, who has a background of many field seasons in Alaska, took for his title the "Geological Features of Alaska."

Glenn L. Parker, district engineer of the Tacoma, Washington, district since May 31, 1913, has recently been appointed chief hydraulic engineer of the Water Resources Branch.

S. K. Love, of the Water Resources Branch, has returned from Idaho, where he has been determining run-off and silt removal from areas believed to be representative of different types of vegetative and timber cover and of various grazing practices. The investigation is being conducted by the Geological Survey in cooperation with the Flood Coordinating Committee of the U. S. Department of Agriculture.

A comprehensive study of the surface- and ground-water resources of southeastern Florida was recently begun by the Geological Survey in cooperation with the cities of Miami, Miami Beach and Coral Gables, and Dade County. A field office has been established at Miami with William P. Cross in general charge. The surface-water investigations are under the general supervision of Donald S. Wallace, district engineer, Ocala, Florida, and the ground-water investigations under the general supervision of V. T. Stringfield.

AWARD OF THE EGLESTON MEDALS OF THE SCHOOL OF ENGINEERING OF COLUMBIA UNIVERSITY

TWELVE distinguished graduates of the School of Engineering of Columbia University were presented at a special convocation on November 27 with the medals for "distinguished engineering achievement" established this year by alumni in memory of Professor Thomas Egleston, who played the chief role in founding the school as the first School of Mines in the United States seventy-five years ago.

The medalists are:

Walter H. Aldridge, a member of the class of 1887, president of the Texas Gulf Sulphur Company.

Major Edwin H. Armstrong, '13, professor of electrical engineering at Columbia.

Marston T. Bogert, '94, professor emeritus of organic chemistry at Columbia.

Gano Dunn, '91, president of Cooper Union.

Arthur S. Dwight, '85, president of the Dwight and Lloyd Metallurgical Company, New York.

Henry Krumb, '98, New York, consulting engineer.

Irving Langmuir, '03, associate director of the General Electric Research Laboratory, Schenectady, N. Y.

Leon S. Moisseiff, '95, New York consulting engineer.

Robert Peele, '83, professor emeritus of mining at Columbia.

Sir Stephen J. Pigott, '03, managing director of the John Brown Company, Clydebank, Scotland.

Robert C. Stanley, '01, president of the International Nickel Company.

Arthur L. Walker, '83, New York consulting metallurgist.

The presentations were made by Dr. Nicholas Murray Butler, president of the university, in the rotunda of the Low Memorial Library, in connection with the anniversary celebration of the School of Engineering. Dr. William O. Hotchkiss, president of the Rensselaer Polytechnic Institute, spoke on "Seventy-five Years of Progress; Empirical Art to Technological Science," and Dr. Harvey N. Davis, president of the Stevens Institute of Technology, made an address entitled "Seventy-Five Years of Engineering Education."

In the future the Egleston Medal will be awarded annually to a single alumnus who has "distinguished himself either in the furtherance of his branch or the profession, in the development of processes or of technique, or in the application of engineering principles."

RECENT DEATHS AND MEMORIALS

PROFESSOR GEORGE ERLE BEGGS, chairman of the department of civil engineering at Princeton University and a member of the faculty for twenty-five years, died on November 23. He was fifty-six years old.

LOUIS B. MARKS, illuminating engineer of New York City, died on November 22 at the age of seventy years.

DR. EARLE KENNETH STRACHAN, associate professor of chemistry at Brown University, died on November 21 at the age of fifty-three years.

DR. E. E. FREE, consulting chemist and physicist, editor of "The Week's Science," died on November 24 at the age of fifty-six years.

DR. HENRY CLINTON FALL, of Tyngsboro, Mass., the entomologist, died on November 14 in his seventy-seventh year.

DR. EDWARD PALMER POULTON, physician at Guy's Hospital, London; the elder son of Sir Edward Poulton, Hope professor of zoology at the University of Oxford from 1893 to 1933, died on October 18 at the age of fifty-six years.

MEMORIAL services for Dr. Jacob Goodale Lipman, dean of the College of Agriculture of Rutgers University and director of the New Jersey Agricultural Experiment Station, who died on April 19, were held on November 23 at Temple Emanu-El, New York. The services were sponsored by institutions, including Columbia and Rutgers Universities and the U. S. Department of Agriculture. The speakers included Dr. Henry G. Knight, head of the Bureau of Chemistry and Soils of the Department of Agriculture; Dr. Gabriel Davidson, general manager of the Jewish Agricultural Society; Professor O. S. Morgan, of the department of agriculture of Columbia University; Dr. Carl R. Woodward, secretary of Rutgers University; Dr. Harold B. Allen, of the National Farm School, and Dr. Arthur D. Goldhaft, of the Baron de Hirsch Agricultural School Alumni Association.

SCIENTIFIC NOTES AND NEWS

ROYAL Medals of the Royal Society, London, which is at present conducting its work at Trinity College, Cambridge, have been awarded for the current year as follows: To Dr. P. A. M. Dirac, professor of mathematics at the University of Cambridge, for the leading part he has taken in the development of the new quantum mechanics, and to Professor David Keilin, Quick professor of biology at the University of Cambridge, for his contributions to biochemistry and entomology; in particular for his demonstration of the part played by cytochrome in the oxidation reduction mechanisms of the living cell; and for his studies of the higher Diptera.

SIR ARTHUR SMITH WOODWARD, until his retirement in 1924 keeper of the Geological Department of the British Museum of Natural History, has been awarded the Hayden Memorial Geological Medal of the Academy of Natural Sciences of Philadelphia. The medal, which is awarded every three years, was given in recognition of "notable contributions in the field of vertebrate and invertebrate paleontology."

THE Anthony F. Lucas Gold Medal for 1940 of the American Institute of Mining and Metallurgical Engineers has been awarded to Dr. Everette Lee DeGolyer, consulting petroleum geologist of Dallas, Texas, in recognition of "distinguished achievement in improving the technique and practice of finding and producing petroleum" and as "one of the first to visualize the possibilities of the application of geophysics to oil prospecting."

THE German Goethe Medal for art and science has been awarded to Dr. Franz Fischer, director of the Kaiser Wilhelm Institute for Research on Coal, situated at Mülheim in the Ruhr.

AT the recent meeting of the Acoustical Society of America at Iowa City, a luncheon was given in honor of Dr. Carl E. Seashore, research professor of psychology at the State University of Iowa, and of Dr. George W. Stewart, professor of physics and head of the department, in recognition of their contributions to acoustics. On the same evening former students and friends of Professor Seashore gave a musical soirée in recognition of his contributions to the science of music, and presented a bronze bust, which was accepted by President Gilmore as a gift to the university.

A LUNCHEON was given in New York on November 22 by the American Association of University Women in honor of Dr. Katharine B. Blodgett, research physicist in the laboratories of the General Electric Company at Schenectady, N. Y.; Dean Virginia Gildersleeve, of Barnard College; Dr. Harry David Gideonse, president of Brooklyn College, and William E. Haskell, Jr., assistant to the president of *The New York Herald-Tribune*.

DR. CHARLES F. BOLDUAN, director of the Bureau of Health Education of the Health Department, New York City, was the guest of more than a hundred coworkers on November 22 at a surprise party in the Health Building to celebrate the thirty-fifth anniversary of his work for public health.

THE degree of doctor of science has been conferred by the University of London on Dr. Niels Bohr, director of the Institute of Theoretical Physics at the University of Copenhagen, and on Sir Robert Robinson, professor of chemistry at the University of Oxford. Because of the war and the absence of the university from London, it will not be possible this year to confer honorary degrees at the Senate House

on Foundation Day. By the authority of the Senate the chancellor has therefore conferred the degrees, *honoris causa, in absentia.*

DR. ROBERT DOERR, professor of hygiene in the faculty of medicine of the University of Basle, has been made a doctor *honoris causa* in natural science in recognition of his work on ultra-virus diseases, especially psittacosis, and the relations between herpetic virus and encephalitis.

DR. WILLIAM B. PORTER, professor of medicine at the Medical College of Virginia, Richmond, has been elected president of the American Clinical and Climatological Association.

PROFESSOR ALPHEUS W. SMITH, chairman of the department of physics of the Ohio State University, has been appointed dean of the Graduate School. Dr. Smith succeeds Dr. George F. Arps, who died on September 16. He will act as dean of the school until a permanent appointment is made.

DR. LAWRENCE F. MARTIN, associate chemist in the Bureau of Chemistry and Soils of the U. S. Department of Agriculture, has been appointed senior chemical engineer in the Chemical Engineering and Development Division of the Southern Regional Research Laboratory at New Orleans.

DR. C. LALOR BURDICK, since 1928 assistant chemical director in the Ammonia Department and technical investigator in the Development Department of the E. I. du Pont de Nemours and Company, has been appointed assistant to the president, succeeding Henry B. du Pont, who was recently advanced to the position of vice-president and member of the executive committee. In 1935 Dr. Burdick organized the Lalor Foundation for the support of purely scientific research.

THE University of Michigan has granted leave of absence for the second semester to Dr. Bradley M. Davis, professor of botany; to Dr. George Y. Rainich, professor of mathematics; to Dr. Ralph A. Sawyer, professor of physics, and to Dr. William P. Wood, professor of chemical and metallurgical engineering.

THE Council of the Royal Horticultural Society, London, has appointed Sir Daniel Hall, from 1902 to 1912 director of the Rothamsted Experimental Station, editor of the society's journal and publications and keeper of the library, in place of the late E. A. Bunyard.

DR. K. K. DARROW, of the Bell Telephone Laboratories, addressed the Ohio Physics Club on November 4 at Findlay College, Ohio. He spoke on "The Fission of Uranium."

DR. E. M. K. GEILING, professor of pharmacology at the University of Chicago, gave the third annual Rockwood lecture of the College of Medicine of the State University of Iowa on November 14. His subject was "The Comparative Anatomy and Pharmacology of the Pituitary Gland."

DR. S. ALFRED MITCHELL, director of the Leander McCormick Observatory of the University of Virginia, recently gave an illustrated lecture before the West Virginia chapter of Sigma Xi, entitled "With an Astronomer to the South Seas."

DR. FREDERICK S. GOUCHER, of the Bell Telephone Laboratories, will give a lecture demonstration entitled "The Microphone and Research," in the Auditorium of the Museum of Science and Industry, Chicago, on the evening of December 1 before a joint meeting of the American Physical Society and the Physics Club of Chicago.

DR. B. HOLLY BROADBENT, director of the Bolton Foundation, affiliated with the School of Medicine of Western Reserve University, delivered the fourth Frank Billings lecture of the Thomas Lewis Gilmer Foundation of the Institute of Medicine of Chicago, on November 24. His subject was "Clinical Significance of a Roentgenographic Method of Measurement of Disturbances of Facial Growth."

BY the will of the late Murry Guggenheim, who died on November 15, the sum of $5,000,000 is bequeathed to the Murry and Leonie Guggenheim Foundation. The foundation, which Mr. and Mrs. Guggenheim incorporated in 1929, built and maintains a dental clinic. It has for its purpose "the promotion, through charitable and benevolent activities, of the well-being of mankind throughout the world." By the will funds are provided for the Dental Clinic to enable it to erect and operate "a fully equipped dental clinic which affords charitable and benevolent assistance to the children of Greater New York through the practical application of dentistry and oral hygiene." Mr. Guggenheim named the Guaranty Trust Company of New York a trustee of the fund. He expressed the wish that Dr. S. S. Goldwater, Commissioner of Hospitals, whose "outstanding ability contributed in such large measure to the establishment of the Murry and Leonie Guggenheim Clinic," would consent to act in a consulting capacity in connection with the construction and equipment of any clinics that may be established.

AMONG recent gifts to Columbia University amounting to $87,760, the largest contribution, $29,100, came from an anonymous donor for a study of respiratory physiology to be carried on for three years. The William J. Matheson Foundation gave $12,450 for research in the departments of bacteriology and neurology; the W. K. Kellogg Foundation contributed $10,000 for the study of rheumatic fever, and Philip

Morris and Company presented $7,000 for research in the department of pharmacology. The department of psychology received from anonymous donors the sum of $4,000 for a salary.

ACCORDING to *The British Medical Journal*, Professor H. C. Souja-Aranjo, member of the Brazilian Academy of Medicine and vice-president of the International Leprosy Commission, has founded two prizes at the academy, each of the value of $2,000—namely, the Kadrowsky Prize for the best work on the bacteriology of leprosy, and the Lieras Acosta Prize for the best work on the immunology of leprosy.

THE trustees of Western Reserve University and of the Brush Foundation have entered into an agreement by which the work on human growth, development and sex initiated by the late Dr. T. Wingate Todd for the Brush Foundation and other foundations as well as future studies sponsored by the Brush Foundation will be conducted through the School of Medicine. Dr. William W. Greulich, research associate in anatomy and physical anthropology at Yale University School of Medicine, has been appointed director of the foundation and professor of physical anthropology and anatomy in the department of anatomy in the medical school.

AT the third International Congress of Neurology held at Copenhagen from August 21 to 25, which was attended by about five hundred neurologists from all countries, it was decided that the next congress should be held in Paris in 1942 or 1943.

THE autumn meeting of the American Society of Agricultural Engineers will be held from December 4 to 8 at the Stevens Hotel, Chicago, under the presidency of K. J. T. Ekblaw.

THE annual dinner of the New York Academy of Sciences and affiliated societies will be given on Wednesday, December 13, at the Hotel Astor at 7:00 P.M.

MORE than sixty professional psychologists and psychiatrists from eastern Massachusetts recently attended a discussion meeting at the President's House, Tufts College, as guests of the following psychologists and psychiatrists connected with the college: Douglas A. Thom, professor of psychiatry; Abraham Myerson, professor of neurology; A. Warren Stearns, professor of psychiatry; Herbert Barry, lecturer in psychology; Leonard Carmichael, president of the college; John L. Kennedy, assistant professor of psychology; Leonard C. Mead, instructor in psychology; Edwin A. Shaw, professor of education; John P. Tilton, assistant professor of education; Nils Y. Wessell, assistant professor of psychology; and Robert A. Young, instructor in education. Among those who spoke briefly on the topic of the relationship between psychiatry and psychology were: C. Macfie Campbell, professor of psychiatry at the Harvard Medical School; Truman Lee Kelley, professor in the Graduate School of Education at Harvard; Edwin G. Boring, professor of psychology at Harvard; Gordon Allport, professor of psychology at Harvard; Ross A. McFarland, of the Fatigue Laboratory of the Harvard Business School; Edna Heidbreder, professor of psychology at Wellesley College; David Shakow, clinical psychologist at the Worcester State Hospital; Vernon Jones, head of the department of psychology at Clark University; Hudson Hoagland, head of the department of biology at Clark University; and E. Stanley Abbott, psychiatrist and psychologist of Boston.

DISCUSSION

A DOZEN MATHEMATICAL ERRORS IN THE "ENCYCLOPAEDIA BRITANNICA"

IN the preface to the "Encyclopaedia Britannica" (1938) it is stated that "three thousand five hundred scholars, scientists, experts, and men of affairs" cooperated in the production of this work. It is to be expected that some errors appear in a work which had so many contributors and which covers such a wide field of knowledge, notwithstanding the emphasis on accuracy and the great claims made along this line. Some of these errors relate to details which interest only the specialists, but there are others which are of wider interest and affect adversely the users of this highly respected and widely distributed work of reference. The latter include the fundamental laws known as the associative law and the commutative law of mathematics. Contrary to common usage these appear in the plural in the articles devoted thereto in the encyclopedia in question. While this is somewhat striking it is not the worst feature thereof, even if it is at first disconcerting.

Under the entry "associative laws," for instance, it is stated that they are "two laws relating to numbers, one with respect to addition and the other with respect to multiplication." The same sentence appears under the entry "commutative laws." In fact, there is only one law in each of the two cited cases. It is the same law when it is used in addition as when it is used in the multiplication of numbers, and it has a large number of other applications. For instance, in the second edition of Webster's "New International Dicitonary" under the entry "associative law," it is said to be a fundamental law of group theory when the elements

re combined, but these elements are usually not numbers, as is now commonly known.

The groups whose elements obey the commutative law when they are combined are known as Abelian groups, and under the entry of "groups" in this encyclopedia it is stated (volume 10, page 914) that a set of independent generators of such a group can be so selected that their orders are powers of distinct prime numbers. This is clearly only possible in the special case when the Abelian group is a cyclic group. Among the other errors which appear under the same entry is the assertion that the group of the cube is the same as the group of the regular tetrahedron, while the latter group contains only one half as many elements as the former, and is a subgroup of the former. The regular solids have received considerable attention in mathematics since the times of the ancient Greeks, and hence it may be assumed that their groups of movements are of general interest.

Under the entry "algebra" in this encyclopedia it is stated that "the earliest known treatise containing problems which would at present be called algebraic is the Ahmes Papyrus (also called, from the name of its former owner, the Rhind Papyrus) now in the British Museum and written 1700–1600 B.C. It is now known that the work along the line of algebra by the ancient Sumerians and the ancient Babylonians is more advanced and probably older than that of the ancient Egyptians. On the following page it is said that the biquadratic equation was solved by Ferrari (1540). As Ferrari was born in 1522 he would have been only about eighteen years old when he first solved this equation. The solution was first published in the *Ars Magna* by H. Cardan in 1545, and there is no evidence to support the statement that Ferrari had obtained it long before the time of its publication and at such an early age as about eighteen years.

Several very elementary errors appear under the entry "arithmetic." On page 356 of volume 2 there appears the following statement: "The fact that twelve is scientifically a more convenient radix than ten (having its half, third and fourth easily expressible), seems to have led to the use of eleven and twelve instead of oneteen and twoteen, after which the denary scale was followed." Since eleven means etymologically one left and twelve means two left, these terms relate to the base ten and have no connection with the base twelve. On the same page it is stated that "the distinction between *abstract numbers,* like 4, and *concrete numbers,* like 4 ft., is an inheritance that serves no important purpose." On the contrary, the concept of abstract mathematics is of fundamental importance and it appears in the earliest extant mathematical developments. The early appearance of abstract mathematics is one of the primary facts of history.

Under the entry "Euler, Leonard" it is said that a complete edition of his works was begun in 1926. As a matter of fact, the first volume of this edition was published in 1911 and edited by H. Weber. As this was an international undertaking which was greatly delayed by the World War, the given date is somewhat striking, especially in view of the publicity given to the vast project of publishing Euler's complete works after several failures along this line. Under the entry "Descartes, René" it is stated in volume 7, page 252, that his lines of reference were preferable at right angles to one another. On the contrary, both he and Fermat commonly used lines of reference which are not at right angles to one another. Unfortunately, it is stated in many other places that the lines of reference used by Descartes were preferably at right angles to each other, and hence this error deserves emphasis. In view of the fact that Descartes's Collected Works are widely available this error can easily be verified.

Under the entry "coordinates" it is stated in volume 6, page 391, that the polar coordinates are attributed to Gregorio Fontana (1725–1803). In fact, these coordinates were used much earlier by Jakob Bernoulli (1694) but were not widely used before the appearance of the *Introductio* by L. Euler. On page 75 of volume 15 there appears the following sentence: "The number of mathematical societies, clubs, and circles organized since the early one at Hamburg in 1690 is exceedingly large, but the number of mathematical periodicals since the seventeenth century is very much larger." Since no one knows the number of mathematical organizations which were formed since 1690 it is misleading to imply the contrary. Many of these organizations lasted only a short time and did not publish any of their discussions. In fact, the number of mathematical periodicals since the seventeenth century is not definitely known.

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A REMARKABLE EXAMPLE OF POLAR MIRAGE

IN midsummer of the present year those on board the schooner *Effie M. Morrissey,* while midway between the tip of South Greenland and Iceland, were favored by a remarkable example of superior or polar mirage. Captain Robert A. Bartlett, master of the *Morrissey,* who has reported the occurrence to me with a view to its publication in SCIENCE, has during an experience of more than forty years in the Arctic seen many polar mirages, but, as he says, none so remarkable as this and certainly none so well checked for position and distance.

On July 17, the schooner was from its noon observation in sunshine found to be in latitude 63° 38′ N and longitude 33° 42′ W. The ship's three chronometers

had been checked daily by the Naval Observatory signal, and the air was calm and the sea smooth. At 4 P.M. with sun in the southwest the remarkable mirage appeared in the direction of southwestern Iceland. The Snaefells Jökull (4,715 feet) and other landmarks well known to the captain and the mate were seen as though at a distance of twenty-five or thirty nautical miles, though the position of the schooner showed that these features were actually at a distance of 335 to 350 statute miles. A checking observation of the sun made at 6 P.M. gave the latitude at that time as 63° 42′ N and longitude 33° 32′ W. It was warm and rainy; the air had throughout been calm and the sea smooth. Captain Bartlett writes: "If I hadn't been sure of my position and had been bound for Rejkjavik, I would have expected to arrive within a few hours. The contours of the land and the snow-covered summit of the Snaefells Jökull showed up almost unbelievably near."

It should be pointed out that superior or polar mirage is always a phenomenon concerned with great distances and, further, is visible for any given features only within a comparatively limited area. This is because the rays from the object must be directed upward into the warmer air layers of an *inversion,* and these inversions are generally at elevations in excess of a thousand meters where the differences in temperature are represented by a few degrees only. The refraction of the rays necessary to bring them down to the surface of the sea where they would be visible thus represents very flat curvatures and correspondingly great distances. The writer has drawn attention to examples where distances of 100 to 300 miles are involved. The example furnished by Captain Bartlett is somewhat in excess of the examples already described.[1]

WILLIAM H. HOBBS

INDEX TO SCHOOLCRAFT'S "INDIAN TRIBES"

THE monumental six-volume work by Henry R. Schoolcraft entitled "Historical and Statistical Information Respecting the History, Condition and Prospects of the Indian Tribes of the United States." which was published in 1851–1857, represents the first systematic attempt on the part of the Federal Government to study the ethnology and archeology of the North American Indians. Because of this fact and because of the early date at which the information was collected, it will always remain a most valuable source of information on American ethnology.

While this report has proved an important reference work on American Indians for nearly ninety years, its usefulness has been greatly hampered because of the fact that heretofore no index has been available. Mrs. F. S. Nichols, of the editor's office of the Bureau of American Ethnology, has now completed an index consisting of about 22,000 entries on cards, which is available in its present form to ethnologists, librarians and other workers who may wish to make use of it.

Those who can not consult it in person may write to the Editor's Office, Bureau of American Ethnology, Smithsonian Institution, and information requested will gladly be furnished by mail.

M. W. STIRLING

BUREAU OF AMERICAN ETHNOLOGY

AVAILABLE LECTURERS IN GEOLOGY AND GEOGRAPHY

SEVERAL months ago a note in SCIENCE announced a tentative plan to furnish university departments with information regarding distinguished foreign geologists and geographers who may be available for lectures. During the summer and early fall, the names of five scholars who wish to make lecture tours were registered with the Division of Geology and Geography. Some of these men have already arranged to give lectures at several universities, and will be glad to make other appointments. Departments that are interested may secure detailed information by writing to the office of the division.

In this connection, attention is called to the Institute of International Education, which acts as a clearing house of information on available lecturers in all fields of learning. This institute publishes a "News Bulletin," issued monthly from October to May, giving specific information about individual lecturers. The bulletin is published at 2 West 45th St., New York.

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SCIENTIFIC BOOKS

DEVELOPMENTS IN PHYSICS

Atomes, radioactivité, transmutations. By MAURICE DE BROGLIE. 269 pp. Bibliothèque de Philosophie scientifique, Flammarion, Paris, 1939. Paper covers, 22 francs.

WITH the distinctive clarity so characteristic of French authors, M. de Broglie gives an account of the developments in physics during the last thirty years culminating in a discussion of the modern concepts of the atomic nuclei and the transmutation of one element into another. Apart from the more profound philosophical aspects of the recent work in this field, and

[1] W. H. Hobbs, *Ann. Assoc. Amer. Geog.*, 27: 229–240, December, 1937.

its fundamental importance to physics, the new science of nuclear chemistry has already demonstrated its usefulness in its applications to medicine and physiology. The promises it holds for the future are nearly unlimited. It is particularly valuable to have at hand a volume which is so up to date and readable as the present one. The book does not require a specialist to understand it, but it will not appeal to the large class of readers of "popular" scientific works who desire more to be mystified than to be informed. Physics is essentially a simple discipline. It becomes abstruse only when it strives for the necessary preciseness by employing the language of mathematics. The text of M. de Broglie approaches closely to this ideal by the written word alone. It is a pity that this quality is so difficult to translate into English, or that we do not have more authors of such lucid style. All of us might well profit, if there were more books of this kind.

Measurement of Radiant Energy. Edited by W. E. FORSYTHE. xiv + 452 pp. Prepared under the direction of a Committee on Methods of Measurement of Radiation of the Division of Physical Sciences of the National Research Council. McGraw-Hill Book Company, Inc., New York and London, 1937. $5.00.

THIS volume consists of a series of contributions by twenty-one authors, each an authority in his field. It describes in detail the methods of measuring radiation in the ultra-violet, visible and infra-red regions. There are four phases of the problem presented: the fundamental concepts of radiation, the sources of radiation, the determination of frequency and the determination of intensity. Each phase is competently presented, and all the necessary precautions are discussed. There are numerous references to the original papers listed at the end of each chapter. The completeness and quality of the material presented are noteworthy, and the detail is carried so far as to include, for example, a chapter on galvanometers and their characteristics in relation to the measurements. The book is an extremely useful addition to the literature of physics, and will become, no doubt, indispensable to a large number of workers.

Atomic Structure. By LEONARD B. LOEB. xiv + 446 pp. John Wiley and Sons, Inc., New York, 1938. $4.50.

To provide a text for a course of lectures to third-year students at the University of California, Professor Loeb has written this volume. He has gathered together from many sources much useful and important material which is generally available only in the more advanced and more specialized treatises in the field of atomic structure. The subject is developed in more or less the chronological order. The first part of the book consists of four chapters dealing with the discovery and elementary properties of x-rays and electrons leading up to a discussion of the scattering experiments of Rutherford which are the basis of the nuclear atomic model. The fifth chapter deviates from the historical order and gives an account of the discovery of the positive electron and the neutron and presents some of the present-day ideas of the structure of the nucleus. The chapter is somewhat of a digression, but it in no way interferes with the logical arrangement. The second part of the book consists of a presentation of the classical quantum theory of Bohr which is outlined in sufficient detail to enable the breakdown of the theory, as shown by the necessity for half integral quantum numbers, to be indicated. The third portion consists of descriptions of the various kinds of impacts among atoms, electrons and photons, and is summarized by a chapter in which all the processes are written in the form of chemical reaction equations.

Professor Loeb states in the preface that "it is his firm conviction that it is impossible to introduce the student properly to the subject directly from the rather abstract and modern wave mechanical view-point. In order that a student really understand and be able to use the modern developments, he must grow into these, much in the same way as the physicists who developed the field have done." Younger physicists who do not regard wave mechanics as so "abstract and modern" will perhaps read this statement with suspicion, and wonder whether Professor Loeb is prejudiced in his text against the newer ideas. Although a criticism of this nature may be partially justified, the reviewer feels that Professor Loeb does not regard wave mechanics as any more abstract than the concept of electrons moving in Bohr orbits, but simply as being mathematically more complex. As a result the text is well balanced and fitted to the abilities of the students for whom the book is intended. It may be remarked that, in common with most other authors, Professor Loeb omits all reference to the fact that J. W. Nicholson derived the stationary orbits of hydrogen a year before Bohr's publications on the subject.

The volume closes with a short chapter on the kinetic theory of gases and two excellent chapters on the electron theory of metals, including a discussion of Fermi-Dirac statistics. This extremely important field is generally not presented to students until they are more advanced. Its inclusion in this work seems an excellent idea.

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PHYSIOLOGICAL PHENOMENA

Analisis Experimental de los Fenomenos Fisiologicos Fundamentales. By JOSÉ J. IZQUIERDO. xxii + 334 pp. Mexico, 1939.

DR. IZQUIERDO presents in this volume, which has been prepared for serious students of biology, a well-selected series of illuminating experiments accompanied by explanations and by stimulating questions. The procedure is that of letting the experiments lead the student from observations on physical and physico-chemical states and processes to observations on the properties and responses of living structures as affected by these conditioning agencies. Thus, diffusion, osmotic pressure and the characteristics of solutions are first considered, and then these phenomena are applied to an understanding of changes induced in simple biological units. Similarly, hydrogen-ion concentration, colloidal solutions and properties of interfaces, the polarization of membranes, chemical equilibria and the processes of oxidation and reduction are dealt with in such manner as to yield insight into an understanding of biological events. The final sections of the book are devoted to the phenomena of excitability and the contractions of cilia and muscles. Throughout, the student learns not only the important facts of general physiology but the application of the physical and chemical methods which are employed in examining biological responses to experimental tests. An introduction to the use of mathematics in evaluating data obtained by experimentation is a feature of the discipline imposed by the book. Frequent references to the original investigators whose experiments the student repeats bring him in touch with the masters of the subject.

In a preface Dr. Merkel H. Jacobs has characterized Dr. Izquierdo's book as "an admirable introduction to the fundamental principles of physiology." This judgment is well warranted. Spanish-speaking students who follow Dr. Izquierdo's excellent experimental course in the basic aspects of biological reactions should not only be very soundly instructed but should be stimulated to further studies.

WALTER B. CANNON

SPECIAL ARTICLES

SPERM AGGLUTINATION IN THE KEYHOLE LIMPET AND THE SEA-URCHIN

THE spermatozoa of the giant keyhole limpet, *Megathura crenulata,* show a striking agglutination reaction upon addition of egg water. The reaction differs from that described by Lillie[1] and Just[2] in the sea-urchin and other animals in that it does not spontaneously reverse. Instead of the clumps breaking up they continue to enlarge by fusion with one another and, in a sufficiently high concentration of the agglutinin, one large agglutinate forms containing most of the sperm. The spermatozoa agglutinate by the tips of their tails as well as by their heads. The agglutinates are spherical in shape with a thin shell of sperm heads at the surface separated from the central mass of sperm by a distance roughly equal to the length of the tail. In small agglutinates, the tips of the tails occupy the center. The reaction resembles that described by Sampson[3] for chiton sperm and by Henle, Henle and Chambers[4] for bull sperm in anti-sera. The head agglutination is, however, not due to a separate head agglutinin present in the egg water but represents an aggregation reaction.

[1] F. R. Lillie, "Problems of Fertilization," The University of Chicago Press. 1919.
[2] E. E. Just, *Protoplasma,* 10: 300, 1930.
[3] M. M. Sampson, *Biol. Bull.,* 50: 301, 1926.
[4] W. Henle, G. Henle and L. A. Chambers, *Jour. Exp. Med.,* 68: 335, 1938.

The limpet agglutinin precipitates in nearly saturated ammonium sulfate, and it is retained by a collodion membrane. By these means active concentrates have been prepared. The preparations give definite xanthoproteic, Millon's and biuret tests. The agglutinin is inactivated by solutions of crystalline trypsin or chymotrypsin (supplied by the courtesy of Dr. J. H. Northrop). Complete inactivation is obtained in 6 days with 1 per cent. chymotrypsin at pH 8 and 22° C.; in 7 days with 1 per cent. trypsin. The controls retain practically their full activity during this period. During the first 3 to 4 days of digestion there is no appreciable loss of activity. After complete inactivation of an agglutinin solution of such titer as to give, when mixed with an equal volume of 1 per cent. sperm, a 10 second macroscopic reaction, the formol titration showed 8×10^{-6} equivalents of $-COOH$ per ml. of solution for the trypsin digests and 13×10^{-6} for the chymotrypsin.

In the sea-urchin, *Arbacia punctulata,* Glaser[5] reported obtaining no definite protein tests except for a faint xanthoproteic reaction. In *Strongylocentrotus purpuratus* we obtain, with material prepared by $(NH_4)_2SO_4$ precipitation and dialysis of concentrated egg water (care being taken to avoid injury to the eggs), the same protein tests as with the limpet. Also, the sea-urchin agglutinin is rapidly inactivated by one of the crystallized proteinases, namely, chymotrypsin.

[5] O. Glaser, *Biol. Bull.,* 26: 367, 1914.

Lillie[1] showed that the activity of sea-urchin sperm increased upon the addition of egg water. The eparations of limpet and of sea-urchin agglutinins o have this effect, as shown by direct observation d by measurements of the respiratory rate of the rmatozoa. In Arbacia it has been reported[7] re-ntly that echinochrome causes the increased activity the spermatozoa. The eggs of Strongylocentrotus not contain echinochrome and attempts[8] to increase activity of the spermatozoa with this substance ve proven unsuccessful.

In both the limpet and the sea-urchin, the agglutinin obtained in highest titer when the jelly surrounding eggs is dissolved by means of acid. Other evidence ints to the agglutinin being either identical with the ly or located in it, but not continuously produced the eggs. The limpet agglutinin is extremely heat-ble, being half-inactivated only after 24 hours boil-g at pH 3. The sea-urchin agglutinin is half-activated after 5 minutes boiling. Both sea-urchin d limpet agglutinins are stable in isotonic NaCl but t in distilled water. At alkaline pH in sea water the glutinins are absorbed by the precipitate of calcium d magnesium carbonates and hydroxides that forms. isotonic NaCl the agglutinins are rapidly inac-vated above pH 11 and below pH 2.

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THE CONTROL OF EXPERIMENTAL ALCAPTONURIA BY MEANS OF VITAMIN C[1]

IN a study of the relation of vitamin C to the tabolism of the melanin pigment precursors tyrosine d dihydroxyphenylalanine in the guinea pig[2] it was served that the animals receiving tyrosine excreted the urine a substance of melanin-like properties. pon examination this proved to be not melanin but mogentisic acid. The production of experimental captonuria in the white rat by phenylalanine feeding s been recently reported by Papageorge and Lewis[3] d by Butts, Dunn and Hallman.[4] Our results may considered as a further example of artificial alcap-nuria although arising from tyrosine feeding and in other species, the guinea pig. In our experiments it appeared that the animals receiving the smaller doses of ascorbic acid excreted the greater amount of homogentisic acid. Experiments were then designed to test this possibility. The guinea pigs were housed in metabolism cages and the urine collected for quantitative analysis. The feeding of 0.5 gm of l-tyrosine with an amount of basal diet containing 0.5 mg of ascorbic acid per day resulted in the excretion of 20–50 per cent. of the theoretical amount of homogentisic acid when determined by the method of Briggs.[5] With the addition of 5 mg of ascorbic acid per day all but a trace of the homogentisic acid disappeared from the urine within one or two days. Subsequent withdrawal of the extra vitamin C resulted in the reappearance of the homogentisic acid to the same extent as before within one to three days. This process could be repeated at will. In order to confirm the results of the quantitative procedure the homogentisic acid was identified by means of the usual qualitative tests, by the characteristic behavior of the lead salt and finally by isolation and identification of the dibenzoyl homogentisamide by the method of Papageorge and Lewis.[3]

The effectiveness of ascorbic acid in controlling this artificial alcaptonuria in the guinea pig led us to perform experiments on two normal human subjects. On a diet practically free of ascorbic acid the daily ingestion of l-tyrosine resulted in the excretion of significant amounts of homogentisic acid which could be completely prevented by the ingestion of reasonably large doses of crystalline ascorbic acid. The lack of alcaptonuric patients in this vicinity has made it impossible to test the effect of extra amounts of the vitamin on an individual who normally excretes homogentisic acid, but we hope that such experiments can be carried out elsewhere in the very near future.

In a further study of this relation of ascorbic acid we have utilized the unnatural d-tyrosine and find that it also causes the excretion of homogentisic acid by the guinea pig although not to the same extent as does the natural isomer. More striking is the fact that we as yet have been unable to prevent the excretion of homogentisic acid arising from d-tyrosine by the administration of the amount of ascorbic acid which completely checks its production from l-tyrosine. This latter point is being further investigated.

The effectiveness of ascorbic acid in influencing the metabolism of tyrosine so as to prevent the excretion of homogentisic acid not only throws new light upon the physiology of this vitamin but furnishes an extremely useful tool in further studies on the intermediary metabolism of the amino acids phenylalanine and tyrosine.

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[7] M. Hartmann, O. Schartau, R. Kuhn and K. Wallenfels, *Naturwissenschaften*, 25: 433, 1939.; R. Kuhn and K. Wallenfels, *Ber. des deutsch. Chem. Ges.*, 72: 1409, 1939.

[8] A. Tyler, *Proc. Nat. Acad. Sci.*, 25: 523, 1939.

[1] Aided by a grant from the Committee on Scientific Research of the American Medical Association.

[2] R. R. Sealock, B. Ziegler and R. L. Driver, *Jour. Biol. Chem.*, 128: lxxxix, 1939.

[3] E. Papageorge and H. B. Lewis, *Jour. Biol. Chem.*, 123: 211, 1938.

[4] J. S. Butts, M. S. Dunn and L. F. Hallman, *Jour. Biol. Chem.*, 123: 711, 1938.

[5] A. P. Briggs, *Jour. Biol. Chem.*, 51: 453, 1922.

SOME CRYSTALLINE CONSTITUENTS OF THE NON-SAPONIFIABLE FRACTION OF BONE MARROW

WE were interested in the isolation of pure substances from yellow bone marrow in the hope that we might find one or more especially effective in the formation, maturing and release of white blood cells, especially the granulocytes. Others have reported that it is the non-saponifiable fraction of bone marrow fat which is effective in the treatment of agranulocytosis. Consequently, we centered our efforts on this fraction, amounting to a few tenths of one per cent. of the entire marrow.

Since the greater part of the marrow in the large bones of beef is fat, we first had this fat extracted by suitable solvents and then saponified it, extracting the valuable non-saponifiable portion from the soap. Our second method called for direct saponification of the entire marrow, a process that probably broke down certain protein structures in the aqueous fraction of the marrow with release of more fat or lipid than is possible with solvents alone. There are advantages in both methods.

By careful fractional crystallization of the non-saponifiable fraction from suitable solvents we isolated four crystalline substances of high purity and a few others which, if not quite pure, are mixtures of closely related compounds not readily separated by solvent fractionation. All these substances were obtained by the second method mentioned above, that is, saponification of the entire bone marrow. Of course, the proteins and water solubles of the aqueous-type fraction were eliminated by the solvents used in extraction.

In addition to the four colorless crystalline products reported below we secured a number of highly colored oily or semi-solid fractions set aside for further study. The four listed below contained oxygen and were e binols.

CRYSTALLINE PRODUCTS

(1) Carbon 73.6 per cent., hydrogen 13.4 per cen melting point 66°–67° C. The benzoate melted at 35°-3 and the acetate at 34°–35°. Molecular weight by Rie micro method (usually found 5–10 per cent. low on kno pure substances) was 296.

(2) Carbon 83.8 per cent., hydrogen 12.2 per cen melting point 147°. Benzoate melted at 144°–144.5°, a tate at 113.5°–114°. The sterol recovered by saponificati of the benzoate melted at 147°. Gave good Liebermann Burchard test for sterols. Mixed melting point test wi cholesterol confirmed identity of this substance wi cholesterol.

(3) Carbon 76.9 per cent., hydrogen 13.0 per cen melting point 61°–63°. The benzoate melted at 137°-13 with preliminary softening and the acetate at 37°-3 Molecular weight by Rieche method, 268.

(4) Carbon 82.2 per cent., hydrogen 12.1 per cent., substance contaminated with cholesterol. Melting po after removal of cholesterol was 124°, not sharp. T benzoate of the purified substance melted at 123°-12 A sterol, forming a digitonide.

This report is wholly preliminary. Further separa tions and purifications of marrow substances, in addi tion to biological testing, are in process and will b reported later in greater detail.

We are greatly indebted to the Abbott Laborator of North Chicago for preliminary processing of t bone marrow which was generously supplied by Swi and Company, and to Dr. H. K. Alber, of the R chemical Research Foundation of Philadelphia, for h micro determinations of carbon, hydrogen and molec lar weights.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

LATEX EMULSIONS IN HUMAN VASCULAR PREPARATIONS

FOR generations vessels and ducts have been filled with materials to make them stand out in anatomic preparations. Many different substances and combinations have been used. The older anatomists introduced many masses which are still useful. For example, in Paris one sees the preparateur injecting melted tallow colored with vermilion. In this country in human anatomy the use of a starch paste prepared by mixing lump starch and color, either red lead or a red lead substitute, with cold water is a common practice. Teichmann's mass was preferred for many years and is still used occasionally. This mass is essentially a heavy oil paint. The late Professor C. R. Bardeen, at the University of Wisconsin, used a shellac which was colored with Prussian blue pigment, in the arteries of human cadavera. This violation of the classic co for arteries resulted in giving the students an oppo tunity to see small arterioles in beautiful contrast t the surrounding reddish tissues. For many years have used, both here and formerly at the Universi of Cincinnati, a variation of this mass, a material pr pared for the electrical industry. This material (Aji —insulating varnish, black air drying No. 26, Sherwi Williams) I demonstrated at the meetings of th American Association of Anatomists at Cleveland. has been equally as satisfactory as the mass that learned to use in Dr. Bardeen's laboratories. It ha the advantage of being ready prepared and cheap.

For corrosion preparations the completely satisfa tory mass has not yet been found. Substances sati factory for smaller structures are unsatisfactory f

ge cavities and vessels. Some of the newer materials produced by synthetic chemistry partially dge this.[1]

With the continuing chemical advances new subnces will be available; one of these seems to be x emulsion. In 1936 I first became acquainted h the properties of latex emulsion through Dr. orge P. Phillips, of Boston. Dr. Phillips told me ething of the working properties of the material advised me as to where it might be obtained and stated that the firm was very cooperative in supping small amounts of the material to the dental and the medical profession. Since that time I have d the material in its various forms, colored and unored, in the preparation of prostheses and in vari- laboratory procedures.

Latex emulsion (Vultex[2] is the preparation that I e used) is a slightly ammoniated water emulsion of ber. When freshly received, the clear material has ilk-white appearance and is of the consistency of am. In my experience the emulsion may be acked" in three ways; simple drying reduces the ulsion to the consistency of rubber found in latex ber gloves. The emulsion is cracked by acidulating with any weak acid. It retains its milk-white color il the water has thoroughly dried out. The emulon can be made into rubber by pouring it into ster of Paris moulds. These moulds should not be viously treated in any way which would destroy ir porosity. The porosity of the mould absorbs the ter from the emulsion, leaving the rubber behind. takes several days or even a week or two for this aining material to assume its final character.

Considering my interest in the injection of vessels in corrosion preparations I am surprised that I not try latex until this present year. We have now the laboratory several human cadavera in which the teries and the veins have been injected with colored ex emulsion. We have also used this material for ee color injections of the kidney. Our work on the olacrimal apparatus has not been satisfactory beuse of the difficulty in causing the material to flow ough small caliber cannulae. The elasticity of the terial makes it seem ideal for the routine injection human cadaveric material. It is not suitable for rosion preparations where one expects to retain the e of the vessel. Corrosion is accomplished as usual h concentrated hydrochloric acid. In my work with ex in plaster moulds I have found a shrinkage of out one in six, so that when sizes must be duplicated e has to expand the mould to allow for this shrinke.

Our procedure for human material is as follows. We use air pressure and an injecting bottle for the latex emulsion much as one would use for the injection of a gun-cotton mass. We rinse the system with weak ammonia water before adding the latex emulsion. We make all connections between the bottle and the structure being injected as short as possible to simplify cleaning. If the material has become somewhat thickened from standing we dilute it slightly with weak ammonia water. We find that about one liter suffices for the arterial injection of the average cadaver. This amount compares with what is used with the other colored masses in the human cadaver. The amount is increased to advantage in many instances. The material is injected from 12 to 24 hours after the intra-arterial embalming is completed. For special venous injections we sometimes make the latex injection before embalming, so that the vessels are not filled with the blood from the capillaries. In work with the human cadavera we have not found it satisfactory to routinely practice the washing out of the venous system. Occasionally we open a vein to allow for some lessening of blood on the venous side.

In working with latex and in preparing to describe its use I made inquiry concerning a material used by a biologic supply firm.[3] The nature of this material was not disclosed, but its description by letter seemed to fit the material that I was using. A reply to a direct question confirmed the fact that this material was indeed a latex emulsion. Examination of a purchased specimen also showed this. There has recently appeared in the house organ[4] of another firm an account of the use of latex emulsions. I can not agree with the statement there made about the expansion of the material. This expansion, if it occurs at all, is very transient and is immediately followed by shrinkage.

The material in question can be obtained from the Vultex Chemical Company, 666 Main Street, Cambridge, Massachusetts. The specific materials that I am at present using for colored injections are as follows: F-934 Red No. 244, F-934 Blue No. 9B, and F-934 Yellow No. 154. Previously the material was furnished in glass or in tin screw-top containers and now for two or three years in iron buckets. In the course of time, especially after opening the material, it begins to rust the bucket, therefore, we transfer the material to glass containers in the laboratory.

Using Abernathy's[5] classification this material would have to be a coarse mass. It will never be suitable for such fine vessels as one may inject with preparations of vermilion nor will it be suitable for formal museum corrosion preparations. I believe it will be invaluable

[1] O. V. Batson, SCIENCE, 81: 2108, 519–20, March 24, 35.

[2] Trade name used by the Vultex Chemical Company their material prepared under the Schidrowitz patents.

[3] Ward's Natural Science Establishment, Rochester, N. Y.

[4] *Turtox News*, General Biological Supply Company, Chicago, Ill.

[5] Abernathy: *Phil. Trans. Roy. Soc.*, London (for 1798), 18: 287, 1809.

for routine preparation of human cadaveric material and will lead to a better concept of structures in many parts of the body. We have adopted it as our routine mass.

It's a pleasure to again acknowledge my indebtedness to Dr. Phillips for having first introduced me to this material, and I should also like to express my thanks for the great consideration given numerous queries and small orders by the various members of the firm of the Vultex Chemical Company.

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LIQUID LATEX AS AN INJECTION MASS FOR BLOOD-VESSELS

NUMEROUS substances have been used in injecting the circulatory systems of laboratory specimens to enable students to trace the course of blood-vessels with greater ease. Gelatin and corn-starch masses in various colors have been used for many years, but both of these have serious faults. Gelatin tends to stain tissue by "jumping" the capillaries and has the added disadvantage of becoming excessively brittle in formaldehyde. Starch mass does not set well if used too thin, and when made thick enough to prevent the running of the mass when a blood-vessel is accidentally cut by the student, it will not fill the smaller vessels.

Recently, plastics have been used with some degree of success, but the polymerization to the solid substance after injection presents such formidable obstacles that it is not yet practical to use for laboratory specimens.

Mr. William Kruse, of Ward's Natural Science Establishment, first suggested the use of latex as an injection mass in March, 1939. Since that time experiments have proven that latex is the perfect substance for this purpose. It will enter the smallest vessels without staining tissue; it may be diluted with water to give the proper consistency; it is used cold, and solidifies to form a tough, flexible solid which forms a perfect cast of the circulatory system. Latex will replace all other substances previously used for filling blood-vessels, and in addition has untold possibilities for use in research on the circulatory, respiratory and excretory systems.

Latex solution of heavy consistency and high pH value, colored with fast, soluble dyes, has proven most practical in this work. The latex may be thinned to any desired consistency by adding distilled H_2O. In larger vessels and ducts the mass should be thicker than for use in smaller cavities and thinner when it is desired to fill blood-vessels to their smallest branches. Syringes with glass cylinders and rubber pistons must be used since it was found that contact with the lubricants used for smooth operation of an all-metal syringe set the mass around the piston, causing it to stick. All-glass syringes were unsatisfactory because rubber solution filled the tiny cavities in the ground-glass piston and set under pressure, making the piston immovable.

The material is injected in the ordinary way through metal hypodermic needles inserted into the cavity it is desired to fill. It sets into a tough, flexible solid almost immediately in animals that have been previously embalmed with solutions of phenol or phenol derivatives or preserved in formaldehyde. When injected into larger spaces in freshly killed animals it is difficult to set. When freshly killed animals are used they must be fixed immediately either in alcohol, embalming fluids containing phenol or phenol compounds or in solutions of 5 to 8 per cent. formalin containing 1 or 2 per cent. glacial acetic acid. If the latter fixative is used it must be injected internally so that it will come into close contact with injected vessels and organs and the animals should also be immersed in the fixative. To prevent the latex from escaping when the needle is withdrawn, a drop of 1 per cent. glacial acetic acid or 95 per cent. alcohol may be applied at the spot where the needle was inserted. A clamp or tie should be used on larger vessels.

Dr. Oscar V. Batson, in the current issue of SCIENCE, describes the use of an emulsion of latex sold under the trade name Vultex. He states that he has experienced difficulty in causing the material to flow into the very finest vessels and further expresses the opinion that latex emulsion will never be suitable for the injection of fine vessels.

Dr. Batson undoubtedly refers to vessels of almost capillary size. We have found that our material, which is a rubber solution in contrast to an emulsion, will pass through capillaries if diluted sufficiently and can be used with the finest of cannulae.

D. L. GAMBLE
WARD'S NATURAL SCIENCE ESTABLISHMENT, INC.
THE FRANK A. WARD FOUNDATION OF NATURAL SCIENCE OF THE UNIVERSITY OF ROCHESTER

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